

'Re'-presenting Qualitative Data from Multilingual Mathematics Classrooms

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Abstract: In this paper I consider what it means to 're'-present qualitative data from multilingual mathematics classrooms. I draw from a recent study that focused on language practices in multilingual mathematics classrooms to explore the different levels involved in the 're'-presentation of multilingual data. The purpose of the paper is not to discuss the details of the study but to use data from the study to raise the awareness of the conceptual underpinnings of data re-presentation in mathematics education research. I use the data to show one perspective to 're'-presentation of multilingual data. The main argument of the paper is that 're'-presentation of multilingual data is not just talk written down, it is inevitably a process of selection and is informed by theory, research questions, tools of analysis and the purposes of re-presenting the data.

ZDM-Classification: D20

Multilingual classrooms are increasingly becoming a norm rather than an exception around the world. By multilingual classrooms I refer to classrooms in which there is more than one language (recognised or not), whether at the level of individual students and teachers, classes, schools or societies. Most published research in mathematics education is conducted in multilingual settings where learners learn mathematics in a language that is not their home language (e.g. Gorgorio & Planas, 2001; Adler, 1998, 2001, Moschkovich, 1996, 1999, 2002; Gutstein, 2003).

The process of re-presentation of data in mathematics education is important to consider for several reasons. First, for nearly all studies investigating the teaching and learning of mathematics transcriptions are the researcher's data. While the focus of some of this research is not on the use of language(s), learners and teachers' utterances are used to make interpretations about the teaching and learning of mathematics. Transcripts are a re-presentation – they are a presentation of the actual interaction in a different form. Second, the process of re-presentation of data has not been foregrounded in empirical studies in mathematics education research. Questions about re-presentation of data cannot be ignored; they are about the validity of the research. Asking whether the transcript is a valid representation of the actual experience is the same as asking why we should trust the transcription. It is therefore crucial that a researcher reflects on the process of data re-presentation. The way in which we re-present our data may affect the validity of our research. If we fail to take account of the way in which we re-present our data the claims that we make about the teaching and learning of mathematics are weakened. It is in this spirit of openness about how data is re-presented that trust is built between the researcher and the reader. As Atkinson, Heath & Chenail (1991) have argued, the process of establishing the trustworthiness of any study comes down

to the quality of the relationship built between the researcher and the community of readers and critics who examine the study.

The main purpose of this paper is to raise the awareness of the conceptual underpinnings of data re-presentation in mathematics education research. The process of re-presenting data is responsive to cultural biases and itself influences readings and interpretations. Whether the researcher has fluency in the multiple languages of the source data or not is not the basic concern addressed in this paper. Rather, the central concern of the paper is the researcher's awareness of the process of data re-presentation and its potential consequences. The paper specifically addresses the following question: How does the re-presentation of data from multilingual classrooms shape the interpretations and conclusions drawn? What does the re-presentation of such data mean for research in multilingual classrooms? To explore the questions raised above, I will draw from a recent study focussing on language practices in primary multilingual mathematics classrooms in South Africa (Setati, 2002). The primary purpose here is not to discuss the details of the study but to use the study to show how the way in which data was re-presented in the study was shaped and shaped the interpretations made. I begin the paper by giving a brief description of the study. This provides an empirical context for a discussion of the different levels involved in the re-presentation of multilingual data. From these discussions I draw the two key arguments of the paper. First, re-presentation of data is a selective process informed by the research questions, the tools of analysis and the purposes of re-presenting the data. It reflects the theoretical goals and definitions of the study. Second, 're'-presentation of data shapes the interpretations that we make and conclusions that can be drawn from the research.

Researching multilingualism in mathematics education

My research concerns the use of languages in multilingual mathematics classrooms. In these multilingual classrooms both the teacher and the learners are multilingual and they share a home language. The language of learning and teaching is English. To explore language use during the teaching and learning of mathematics I video-recorded the lessons. Decisions about how to record data in a research are influenced by the researcher's assumptions about what counts as data. What counts as data and what is perceived as meaningful data depends on the theoretical perspective and the purposes of the research. Such assumptions also shape the researcher's interpretations of what they see, hear and record.

My research on language is framed by a discourse perspective where language is not only regarded as a tool for communication and thinking but also as a political tool. In this perspective interactions involve ways of being in the world which include words, actions, values, beliefs, attitudes, social identities and gestures, glances and body positions (Gee, 1996). Thus what counts as data is not only what is said, but also how it is said and the

social positioning of the speaker. Using videotape during lesson observations even though I had an observation schedule provided a moving record of the interaction. I was able to capture both the oral and the visual aspects of the interaction - the teachers' and learners' utterances together with their body language and what they write on the board. I decided against using an audiotape because it gives a decontextualised version of the interaction - it does not include visual aspects of the event, neither the setting or the facial and bodily expressions of the participants.

While videotapes provide richer contexts for interpretations than do audiotapes, both of them are selective. Neither of them can capture the entire interaction experience because data collection is a selective process informed by theory. The selection in collecting data is not only about how much one records the actual interaction, but also about what is recorded. The researcher chooses what to notice during observation. For example, it is easier for a researcher to notice and record what she can see or hear rather than what she can touch or smell (Riessman, 1993). Whatever taping method is used, it is impossible for a researcher to record the actual experience fully. Tapes do not include all aspects of social interaction. In her discussion of Haraway's (1988) critique of the scientific method, Linda Brodkey (1992, cited in Riessman, 1993) points out that seeing is always partial and is limited to what can be 'seen' from a particular position:

"That we see the world from particular vantage point also means that what can be seen by either a human eye or a human theory is necessarily partial, that is both an incomplete and interested account of whatever is envisioned." (Reid, Kamler, Simpson, Maclean, 1986: 297 - 298, in Riessman, 1993).

Re-presentation of data occurs at different levels: from the actual experience to transcription (from oral to written language), from transcription to translation (from the language of source data to the language of re-presentation) and from translation to interpretation (from the voice of the researched to the voice of the researcher). Re-presentation of data is not only an issue for research in multilingual mathematics classrooms but also an issue for all research. Focusing on data from multilingual classrooms, however, shows how 're'-presentation of data is further complicated by the questions relating to the complex linguistic and cultural context of the research, the researched and the researcher. Words are not just words, the grammatical meanings of any utterance gives only a clue of the meaning of what is being said. Most of the meaning of what is said is situated and thus has to be understood in context. How data is re-presented at different levels shapes the interpretations that are made in the same way the kinds of interpretations the researcher is making shape the re-presentation of data.

From the Actual Experience to Transcription

To enable an analysis of language use in my research it was important that recorded data is re-presented in some kind of text, in the words of Ricoeur, a 'fixation' of action into written speech (Riessman, 1993: 11). Transcribing interaction is not a straightforward process.

"Transcribing involves translating from oral language, with its own set of rules, to a written language with another set of rules. Transcripts are not copies or representations of some original reality; they are interpretative constructions that are useful tools for given purposes." (Kvale, 1996: 165)

Transcriptions are tools commonly used by researchers to understand teaching and learning in mathematics education. Underlying much of this work is the belief that it is possible to transcribe talk from the actual experience in an objective way. Green, Franquiz & Dixon (1997) argue that transcribing is a political act that is situated within a study or program of research. A transcript should be understood as text that re-presents the event and not the event itself. What is re-presented in the transcript is data constructed by the researcher for a particular purpose, not just talk written down.

All transcription is re-presentation; there is no natural or objective way in which talk can be written (Roberts, 1997) and there is no such a thing as a 'natural' mechanism for the re-presentation of speech (Atkinson, 1992: 23). An important question to ask however is what informs the choices that the researcher makes in recording and re-presenting the interaction?

Decisions about the amount of detail to include in the transcription are not just theory-driven and rhetorical, but depend on the purpose of the transcription. It is therefore possible to get a number of possible transcripts from one audiotaping, ranging from very detailed (or 'narrow') transcripts to much less detailed (or 'broad') ones. The challenge for the researcher is to produce a transcript that can best represent the interactions they have recorded and this means managing the tension between accuracy, readability (Roberts, 1997) and what Mehan refers to as the politics of representation (Mehan, 1993). It is important to realise that even with more sophisticated computer-aided recording and transcription; it will not be possible to capture all detail because speech has far more detail in it than any recording or transcription. In fact, if a lesson transcript showed all details (talk and action) of the lesson, then a transcript of a 30 minute lesson would be a book with many pages. Every decision about how to transcribe tells a story, the question is whose story is being told.

Let me illustrate some of the above ideas with an example from a transcript of a lesson. The extract below is from a recent study on language practices in multilingual mathematics classrooms (Setati, 2002). The extract shows the interaction between the teacher and the learners in a grade 4 mathematics classroom in South Africa at the beginning of a lesson. Both the teacher and the learners in the extract are multilingual. While the actual interaction occurred in two languages (Setswana & English), only the translated version is given here to illustrate to the reader what the researcher has selected to make visible to the reader and how it shapes the interpretations made. Later in the paper the same extract is presented in the languages of the actual interaction.

Extract 1a

1. Teacher: Please let us take out our books fast so that I can check the homework quickly. We are going to

- start with that one which has two problems (*Referring to the homework*).
2. Learner: That one is not ours (*Different groups of learners were given different homework exercises to do.*)
 3. Teacher: I know that it is not yours, I know. You have finished doing those two problems, right? Please check your friend's work. Look at your friend's work. Grade fours you are making noise. Just sit down and keep quiet, I want to check your homework! (*Shouting loudly and emphatically*). Please check whether your friend next to you has done the work or not, but do not talk. (*She moves around checking the pupils' books.*)
 4. Pupil: He did not do it.
 5. Teacher: Who did not do the work?
 6. Pupil: These two.
 7. Teacher: Why did you not do the homework? I said you should not lose your homework. You should not forget your homework at home. This means when you finish writing your homework you should put the book in your bag immediately. It is okay, who did their homework? Raise up your hands. (*Referring to those who did their homework*). All those who did their homework should raise their hands. (*The learners raise their hands.*) Now it is the whole class, it is only Mimi who we are concerned about. Er, let's clap hands for ourselves all of us. (*They clap hands.*)

The extract above shows what the teacher and the learners said, how and some of their actions. What is interesting is that the extract does not show everything about how things were said and all the actions but only some of it. Utterances 1 and 2 include an explanation of what the teacher is referring to when she says "that one". She is referring to the homework she had given them the previous day. Utterance 3 shows that the teacher shouted loudly and emphatically and also that she was moving around the class as she was speaking. Utterances 1 and 2 do not show the details of the intonation of the teacher and learners' voices. The reference to a loud and emphatic voice of the teacher in utterance 3 suggests that there was nothing distinctive about the teacher's voice in other utterances.

Looking at the extract we cannot say much about how language(s) were used. All we can say is how English was used. The teacher was regulating the learners' behaviour, getting them to take out their homework books and check each other's work. The fact that we are looking at a translated version of the extract limits the interpretations that we can make about use of language(s) in the interaction above.

As it will become clear later in the paper, the visibility of the action that accompanied the talk and presenting the data in the languages of the actual interaction was key in the interpretations made. The interpretations made would have been impossible without foregrounding the voice intonation of the teacher in utterance 3. The point I am making here is that as a researcher I made a choice to make visible those aspects of the interaction that were relevant for the study. The fact that the teacher changes her voice when saying some things is important to

highlight for an analysis of the use of language(s) that recognises language as more than just a tool for communication and thinking. A transcript is shaped by and, in turn shapes what can be known about the interaction and its context. Transcripts are partial representations and the ways in which data are re-presented renders a range of meanings and interpretations possible. As indicated earlier, the above extract is presented in English, however, the actual interaction was in two languages (English and Setswana). In the section that follows I discuss the next level of re-presenting multilingual data from transcription to translation.

From Transcription to Translation

A crucial question to consider regarding the re-presentation of data from transcription to translation is what the purpose of the translation is. In most mathematics education research publications transcripts are given in the majority (or dominant) language (e.g. English) seemingly to enable the readers who do not understand the language in which the actual interaction occurred gain access to the interaction. For instance in their recent paper entitled "teaching mathematics in multilingual classrooms" Gorgorio & Planas (2001) present an analysis of transcripts that are presented in English. It is very obvious when reading the paper that while the transcripts are presented only in English the interactions did not take place in English. The language of learning and teaching in the multilingual classes they were studying is Catalan and the learners had fluency in other languages such as Bangla, Urdu and Spanish. What is not clear in the paper is from which language(s) the transcription versions we read in the paper were translated and from which version were interpretations made.

All transcription is re-presentation. The researcher makes decisions about the amount of detail that should be included in the transcript and these decisions need to be made explicit to the reader especially if it concerns data from multilingual classrooms. Re-presenting data from transcription to translation inevitably involves translation from one language to another. In most cases the translation is from 'minority' languages¹ to the language of re-presentation (e.g. English).

Language is part of and emerges from culture, including ways of being, seeing, arguing, reasoning, questioning and making sense of the world, as well as academic and philosophical traditions (Barwell, 2002). Barwell further argues that the dominance of English in Mathematics Education research reproduces the educational and social disadvantage of researchers, teachers and students of less favoured languages. The process of translation is made complex by the fact that language is not just a vehicle to express ideas, but a social product that arises from a particular context. The context of the talk is not simply those things that exist around the talk, the physical objects

¹ The phrase 'minority languages' is used in this paper not to refer to the number of people who speak the particular language, but to refer to the less powerful languages (politically). For instance, while IsiZulu is spoken by a majority of people in South Africa, it is regarded as a minority language because of its socio-political status.

and so on; it is those things beyond the words being spoken which contribute to the meaning of the talk (Mercer, 1995: 68). This context of the talk can be educational, historical, cultural and political. It emerges from the relationship, the language and culture that the interactants share. An interaction between people cannot be interpreted from only what they say in terms of the word meanings. Words and utterances have a history and context, they come out of experiences and therefore their meanings are situated. My argument here is that interactions in multilingual classrooms should be examined in terms of the relationships and context from which they are generated.

The biggest challenge in any process of transcription and translation is ensuring that the actual experience is represented in such a way that the integrity of the actors is preserved. Translation is itself a process of interpretation. The researcher does not only interpret what has been said in one language into another language, she also makes decisions about what is important to translate for the study. For instance, in one translation the researcher can make the detail of the action that accompany the conversation visible while in another these are not shown. The context of the interaction and the purpose of the transcription also inform the process of transcription. In many ways, translation is another form of reality construction.

“Researchers do not have direct access to [teachers’] experience (or thinking). We deal with ambiguous representations of it – talk, text, interaction and interpretation. It is not possible to be neutral and objective, to merely represent (as opposed to interpret) the world.” (Peller, 1987, in Riessman, 1993: 8)

Analysing translated data can yield different interpretations to analysing an non-translated version. The questions here are: why translation of data? How does the translation of data shape its interpretation? A transcript (translated or not) is not and end in and of itself, it is an analytic and interpretive tool constructed for the purposes of the research. In the discussion that follows I present a non-translated version of Extract 1a (Extract 1b) which I discussed earlier. Through this non-translated version of the extract I illustrate how the way in which data is represented is shaped by and shapes the interpretations made.

From Translation to Interpretation

The research questions together with the tools of inquiry that the researcher is using guide interpretation of any data. Tools of inquiry are like thinking devices that guide the researcher to ask certain kinds of questions about data. One of the interpretations that emerged from the analysis of my data is that during mathematics teaching in a multilingual class, the learners’ home language (Setswana) functioned as the language of solidarity while English functioned as the language of authority. To illustrate how these interpretations emerged from the data and how analysing transcribed data in the language of the actual interaction shaped the analysis, I present two lesson extracts (1b & 2). In the extracts, the translation is provided in square brackets.

Solidarity is defined as “unity in a group of people because of similar ideas, feelings, hopes, determination etc.” (Ruse & Katz, 1991: 628). This definition highlights similarity and shared attributes as important aspects of solidarity. The phrase ‘language of solidarity’ was used to describe to the language in which solidarity is expressed. The phrase ‘language of authority’ was used to refer to the language in which the teacher expresses control, supremacy, influence and power.

Some of the words and phrases in the extract below are bolded to draw the attention of the reader to how they are used. The discussion below will highlight the importance of these words in the interpretations made.

Extract 1b

1. Teacher: **Ke kopa re** ntshe dibuka tsa rona ka speed ke tlo cheka homework ka pele. E, go siame. **Re** tlo simolla ka ela ya dipalo tse pedi tsel. [**Please** let us take out our books fast so that I can check the homework quickly. Yes, it’s fine. **We** are going to start with that one which has two problems.]
2. Pupil: E le ga se ya **rona**. [That one is not **ours**] (*Referring to the homework. Different groups of learners were given different homework exercises to do.*)
3. Teacher: ... **Ke kopa** o cheke mosebetsi wa chomi ya gago. [**Please** check your friend’s work.] Lebella mosebetsi wa chomi ya gago. [Look at your friend’s work.] **Grade 4’s you are making noise. Just sit down and keep quiet, I want to check your homework!** (*Shouting loudly and emphatically.*) Lebella gore tsala ya gago mo thoko ga gago gore o dirile tiro **tuu**, mare o seke wa bua. [Please check whether your friend next to you has done the work or not, but do not talk.] (*She moves around checking the pupils’ books.*)
4. Pupil: Ga a etsa. [He did not do it]
5. Teacher: Ke mang o sa dirang tiro? [Who did not do the work?]
6. Pupil: Ba two. [These two.]
7. Teacher: Ke eng le sa etsa homework? [Why did you not do the homework?] Ke rile le ske la latlha homework. [I said you should not lose your homework.] Le ske la lebala homework ko gae akere? [You should not forget your homework at home right?] Ke gore fa o fetsa go etsa homework o e tseye o be o e tsenya mo bekeng ya gago. [This means when you finish writing your homework you should put the book in your bag immediately.] Go siame, ke bomang ba dirileng homework? [It is fine, who did their homework?] Emisang matsogo a lona. [Raise up your hands] (*Referring to those who did their homework*) Ba botlhe ba ba itsitseng homework ba emise matsogo a bone. [All those who did heir homework should raise their hands.] (*They raise their hands.*) Jaanong e setse e le class e otlhe, ke Mimi fela a re tshwenyang. [Now it is the whole class, it is only Mimi who is concerning us.] Er, ba botlhe tla re ikopeleng matsogo. [Er, let’s clap hands for ourselves all of us.] (*They clap hands.*)
8. Teacher: Kana bale ba group ele ya rona e re etsang homework e, ke kopa le nnele ko pelenyana **tuu**.

[Those from the group that did this homework, can you sit in front **please**.] Di pedi fela. [They are only two.] Ke tshwengwa ke, tla fa pele **papa**. [I have a problem, come to the front **papa**.] (*A group of learners who did the following problems for homework go to the front to do corrections: 113 X 22 and 141 X 22*). Babang bale, o ntsha homework ya gago. [Those ones, take out your homework.] Akere yone e one fela. [It is only one problem right.]

The Setswana utterances in the above extract are prefaced by the phrase 'ke kopa', which means 'please' in English indicating that the teacher is not demanding but requesting. Utterances 1, 2, 7 & 8 are in contrast to when she speaks in English in utterance 3 where she shouts loudly and emphatically that the learners should keep quiet and take out their books. Utterance 3 suggests that the teacher was irritated by the fact that the learners were not keeping quiet and co-operating like she was requesting them to. As a result she shouted an instruction in English. She seemed to be calling on her authority as a teacher and also at the superiority of the English language. After asserting her influence by shouting loudly and emphatically in English she immediately switches to Setswana and uses the word 'tuu', which highlights the depth of her request to the learners. The situated meaning of the word 'tuu' could not be translated into English.

While, the word 'tuu' is regarded as a less formal way of making a plea in Setswana, it is usually used to show the seriousness of the plea². If someone makes a request by using this word, it would indicate that whatever they are requesting, they couldn't do or get on their own. It communicates the fact that the speaker needs the co-operation and understanding of the listener. This is the reason why this word is sometimes used together with the formal Setswana word for please to show the depth and seriousness of the plea (eg. "ke a kopa tu" which can best be translated as "please please"). The teacher did not only use the word 'tuu' in extract 1. See extract 2 below (utterance 11) for another example in which the word 'tuu' was used.

In utterance 8 the teacher uses the word 'papa' to refer to one of the learners. While the literal English translation of the word 'papa' is dad (father), when talking to children this word can be translated to English as 'son'. It is an informal way of referring to a boy-child in colloquial Setswana and it highlights the close relationship between the speaker and the child involved. It would be improper to use this word to refer to a boy-child you did not know closely. In extract 2 below the teacher used another word that carries a similar situated meaning- 'ngwanake' (utterance 9).

Extract 2

9. Teacher: Ena, ke ya group e neng e tlile pela fa akere. [This test is for the group that came to the front.] The first group. Buka ya gago Tebogo tlaya

tla o simolle go kwala. [Get your book Tebogo and start writing.] **Ro** kwala jang **re** bua? [How can **we** write while **we** are talking?] Ntsha fela konopo ya gago neh. [Take out your button.] Nana, tsamaya go kwalla fale. [Nana, go and write there.] Kenosi a **re** didimaleng **tuu**. [Kenosi let **us** keep quiet **please**.] **Moses start! Morero start! Use your buttons! Underline Neo. Moses, keep quiet and do your work!** (*Shouting. She walks around the class.*) Lucky, kwala **ngwanake**. [Lucky, write **my son**.] Kana o mongwe o nna jaana bagaetso a kere o a kwala, o sa kwale, a sena pene ga ene re fetsa, a ba a tla go raa are mam ga ke na pene. [I know that others sit there even when I say write they do not write because they do not have pens and then at the end they say mam I do not have a pen.]

10. Pupil: Ke mang teacher? [Who is that teacher?]
 11. Teacher: Ke tsone dilo tse ke di tlholang akere. [Those are the things I am checking now.] Gore ke seke ka makala gore ko morago nna ke re batho bo botlhe ba a kwala. [So that I should not get surprised at the end thinking everybody was writing.] Babang ga ba na dirula, ga ba thale. [Others do not have rulers, so they are not underlining.] Thala **tuu**. [Underline **please**.]

Extract 2 also shows the different ways in which the teacher used Setswana and English. The one sentence that the teacher said in English is also highlighted and indicates that the teacher is shouting at the learners. Again here English is being used as a language to demand (and not negotiate) good behaviour from the learners. Setswana, on the other hand remains the language of support, and this is evident in the words that the teacher is using in utterances 9 and 11.

The literal English translation of the word 'ngwanake', in utterance 9, is 'my child'. The situated meaning of the two words, 'papa' and 'ngwanake', is the same. That is, in the context of the lesson these two words are used to mean the same thing. Lucky, the learner who the teacher refers to as 'my son' in utterance 10 is not the teacher's son and they are not even relatives. The meaning of the word "ngwanake" as used by the teacher here cannot be assumed on the bases of its grammatical translation in English. In this classroom context it is used to show solidarity, unity and shared aims and hopes. The situated meaning is based on the language, culture and context that this teacher shares with her learners. By using these words this teacher is communicating a message beyond the words, expressing to the learners the fact that she is with them and she understands where they are coming from.

What is more interesting is how the teacher switches between showing solidarity and showing authority. As in extract 1 the teacher uses English to instruct and emphasise authority and then switches to Setswana, which she uses to support and encourage the learners. The way in which the teacher uses pronouns also shows how Setswana was used to show solidarity. As can be seen in extracts 1b and 2 above, when speaking in Setswana, the teacher uses the collective pronouns, 'we',

² The word 'tuu' may have a different situated meaning in other African languages and in different contexts.

'us' and 'our' (utterance 1, 2 and 9), suggesting that she identifies and counts herself with the learners. This is different from her utterances in English that are distant, unfriendly and about control, power and authority.

Of importance for this paper, however, is not how she uses English, but how analysing the data in Setswana and considering the situated meanings of the Setswana words used shaped the interpretations made. The relevance of how she uses English is therefore in comparing how different is this use from the way she used Setswana. If the above data were only re-presented in English (i.e. the translated version only), it would not have been possible to see how the switch from solidarity to authority and vice versa was accompanied by the switch from Setswana to English and vice versa. It would not be possible to make the conclusion that this teacher used Setswana as the language of solidarity and English as the language of authority. Analysing the data in the language of actual interaction is not the only factor that shaped the interpretations made. Another factor is that the way in which data is re-presented makes visible some of the non-verbal communications of the teacher. In utterance 3 (extract 1) the transcript highlights the fact that the teacher said the words "Grade 4's you are making noise. Just sit down and keep quiet, I want to check your homework!" in a loud and emphatic shout. Including this information in the transcript draws the reader's attention to the unusual loudness and emphasis in the teacher's voice. This unusual behaviour was important to show in the transcript specifically because it foregrounded the context of the interaction.

Suggestion for a way forward

I have discussed the different levels of data re-presentation: from actual experience to transcription, from transcription to translation and from translation to interpretation. I have argued that re-presentation of data is a process of reality construction; it is inevitably selective and informed not only by theory but also by the research questions, tools of analysis and the purposes of re-presenting the data. I have used data from a recent study in multilingual mathematics classrooms to show these different levels of data re-presentation. The extracts presented in this paper are a moment in the history of the conversation between the teacher and her learners. I have shown how considering the situated meanings of the Setswana and English utterances in the extracts and the context in which they were uttered led to a conclusion that Setswana was used as the language of solidarity and English as the language of authority. The main argument of the paper is that the way in which multilingual data is re-presented shapes its interpretation and hence the findings and conclusions of the study.

As indicated earlier, it is not possible to capture in a transcript all the action that occurred in the actual interaction. The researcher thus has to make decisions about what level of contextual information will be included to allow the reader to follow the researcher's interpretive process.

Within mathematics education we could seek to

highlight the re-presentation of data from multilingual mathematics classrooms by presenting the transcripts used in the languages of the actual interactions. Through this practice we can preserve the integrity of the interactants and allow our readers to judge the validity of our interpretations. In this way we can act against the privileging of a small number of languages (e.g. English) and the ways of thinking, seeing and valuing that accompany them. We can also highlight the fact that multilingual classrooms are a norm in many parts of the world and not an exception.

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